IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant : John C. Connolly et al. Art Unit : 2828
Serial No. : 09/710,362 Examiner : James A. Menefee
Filed : November 10, 2000
Title : METHOD FOR CONTROLLING CURRENT SPREADING IN SEMICONDUCTOR LASER DIODES

Commissioner for Patents
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REPLY TO ACTION OF OCTOBER 9, 2003

In reply to the Office Action of October 9, 2003, Applicants submit the following remarks.

Claims 24-25, 28-30, and 32-35 are pending, with claim 24 being independent. Applicants acknowledge the Examiner's withdrawal of all prior rejections.

35 U.S.C. §§ 102 and 103

Claims 24, 28-30, 33 and 35 have been rejected as allegedly lacking novelty over U.S. Patent No. 5,778,018 ("Yoshikawa"), and claims 25, 32 and 34 have been rejected as allegedly obvious over Yoshikawa. Applicants request withdrawal of these rejections because Yoshikawa does not disclose or suggest the subject matter of independent claim 24.

Independent claim 24 recites a ridge waveguide semiconductor laser diode that includes a first cladding layer having a ridge with a first width at a bottom of the ridge, a second cladding layer, and an active layer disposed between the first and second cladding layers. A defined gain region within the active layer has a second width greater than the first width and is adapted for conducting current. Ion-implanted reduced conductivity regions within the active layer flank the defined gain region, and the second width is selected such that the defined gain region supports a fundamental lateral mode of the light, while higher order modes are not supported due to their overlap with the reduced conductivity regions.

Yoshikawa does not disclose or suggest a ridge waveguide semiconductor laser. To the contrary, Yoshikawa relates to a vertical-cavity surface emitting laser ("VCSEL") (see, title and

abstract), which is fundamentally different from an ridge waveguide laser, which are all edge-emitting lasers. Indeed, Yoshikawa describes how edge-emitting lasers (e.g., ridge waveguide lasers) differ from VCSEL's (see, e.g., col. 1, ll. 21-33).

In a ridge waveguide laser, a ridge extends along the cavity of the laser resonator and is adapted to inject current into the laser and provide weak index guiding of the generated light along the length of the laser resonator. See, e.g., Semiconductor Lasers, Agrawal and Dutta, pp. 197 - 212 (Kulwer Academic Publishers, Norwell, Mass. 1993) (previously submitted as Exhibit A to applicant's reply to the Office Action of January 27, 2003). In contrast, the post structure in Yoshikawa's VCSEL forms a Distributed Bragg Reflector ("DBR") at one end of the laser resonator for reflecting light at that end of the resonator (col. 1, l. 44 – 64). See also, Semiconductor Lasers, pp. 472 - 486 (Exhibit A). In summary, ridge waveguide lasers and VCSEL's are well known in the art as fundamentally different structures, and the post-type DBR in Yoshikawa would not be considered an equivalent to the ridge of a ridge waveguide semiconductor laser. Therefore, Yoshikawa does not disclose or suggest a ridge waveguide semiconductor laser.

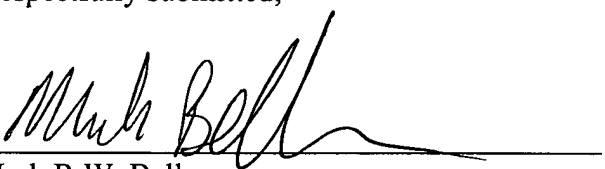
Yoshikawa discloses inactivated regions flanking an active layer (see Fig. 1). However, Yoshikawa does not disclose or suggest that the width of the active layer between the inactivated regions is selected such that a fundamental lateral mode of the light is supported, while higher order modes are not supported due to their overlap with the reduced conductivity regions. Rather, the dimensions of the DBR post are chosen to support only a single mode in the VCSEL resonator (see col. 5, ll. 4-41, col. 6, ll. 53 – 66). In contrast, the width of the active layer between the inactivated regions is not selected to achieve an effect on the optical mode of the laser. Therefore, Yoshikawa does not disclose or suggest ion-implanted reduced conductivity regions within the active layer flanking a defined gain region, where the regions are separated by a width that is selected such that the defined gain region supports a fundamental lateral mode of the light, while higher order modes are not supported due to their overlap with the reduced conductivity regions.

For at least these reasons, applicants respectfully request allowance of claim 24. Claims 25-35 depend from claim 24 and are allowable for at least the reasons that claim 24 is allowable.

No fees are believed to be due at this time. Please apply any other charges or credits to deposit account 06-1050, referencing Attorney Docket No. 14564-011001.

Respectfully submitted,

Date: 11/9/04



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